HA82.8C213 60 NMNS

RESERVED/RÉSERVÉ

NOT TO BE TAKEN FROM THE ROOM
POUR LA CONSULTATION SUR PLACE

OCT 14 1987

BIOME

A publication of the National Museum of Natural Sciences

Vol. 7:3 1987 ISSN 0712-9319

Arctica The Land Beyond

Beyond the mainland of northern Canada lies a silent world of subtle beauty, the Canadian Arctic Islands, covering a total of 1.4 million square kilometres. But despite its variety of landscapes, potential resources and strategic significance, this huge archipelago is virtually unknown to most Canadians.

The National Museum of Natural Sciences has played an important part in the exploration and scientific discovery of the Canadian Arctic Islands. In an attempt to create greater awareness of the region, and to pay tribute to those scientists who have contributed so much to our knowledge of the North, the Museum has prepared a temporary exhibit, *Arctica*. The exhibit highlights some of the research the Museum has undertaken in the High Arctic since its first expedition 74 years ago.

Prior to this expedition, almost all specimens from the Canadian Arctic enriched natural history collections outside Canada. The lure of the "Far North" and the search for the Northwest Passage attracted explorers from several countries to the Arctic well before (and after) sovereignty over the region was ceded to Canada by Great Britain in 1880. The materials that they collected in the course of their explorations became the bounty of their sponsor country — not Canada.

It was not until the turn of the century that Canada made any serious attempts to assert its sovereignty over the newly acquired Arctic Islands. After a few "flag-waving expeditions," the government turned its support to scientific exploration.

In 1913, the Geological Survey of Canada and its Museum, forerunner of the National Museum of Natural Sciences, embarked on the largest, most ambitious programme of arctic exploration yet undertaken — the Canadian Arctic Expedition. This was the first Canadian-sponsored expedition to

(continued on page 2)

Geological Survey of Canada

Scientific staff of the Canadian Arctic Expedition in 1913. Standing in the front row are R.M. Anderson (holding hat) and Vilhjalmur Stefansson (wearing bowler hat).

An international meeting, "The Canadian Arctic Islands: Canada's Missing Dimension," sponsored by the National Museum of Natural Sciences, will be held at the Victoria Memorial Museum Building, November 22–24, 1987. An invitation to attend this meeting is extended to workers in various fields such as Botany; Zoology; Earth, Ice, Marine and Atmospheric Sciences; Human Prehistory and History, who have contributed to our knowledge of the natural heritage of the Canadian Arctic Islands. Native northerners are particularly welcome. The distinguished arctic mammalogist and administrator, Dr. John S. Tener, is General Chairman of the meeting.

The objectives of the meeting are: to provide a broad, current coverage of knowledge concerning the natural heritage of the region; to place this knowledge in historical context with a view to the future; to detect significant gaps in our present understanding of natural processes in the region and to suggest ways of filling such gaps; to disseminate this knowledge through a well-illustrated and referenced scientific publication; and to promote liaison between Canadian workers and those from abroad.

A plenary session (open to the public) covering several topics of general interest, lectures, poster papers, a film session and reception are all part of the meeting. For further information, please contact: Dr. C.R. Harington, Paleobiology Division, NMNS, (613) 954-0351.

NATIONAL MUSEUMS OF CANADA
MUSÉES NATIONAUX DU CANADA
LIBRARY — BIBLIOTHÈQUE

National Museums of Canada Musées nationaux du Canada

Canada

EDITORIAL

Museum-based Research

"Research" is a funny word. According to the dictionary, it is a noun meaning: "A diligent and systematic enquiry or investigation into a subject *in order to discover or revise facts, theories, etc.*" Most people, however, use it incorrectly to mean a study in which facts are *assembled*, not *discovered*. I imagine few people consider that it is still possible to discover any more, but that is precisely what we do at the NMNS. Our curators attempt to discover what the world contains and how it works.

The difference between university and museum research is essentially that museums base their work on material evidence which they keep as vouchers and repositories of data. In a natural history museum, the material we collect as part of research (enquiry to discover facts) is that which is the product of nature, encompassing the living world (plants, animals, etc.) and the non-living world (everything from galaxies to diamonds).

A fact is that which actually exists or happens. A theory is a proposed explanation for a phenomenon, but this explanation is still regarded as conjectural. Curators at our museum use the facts which they have discovered to create theories which attempt to explain how a phenomenon actually works.

Theories are extremely useful intellectual devices. If you know how something works, you can predict what it is going to do and adjust your own behaviour to suit. For instance, it is theory (for which there is good evidence) that large tropical fish predators sometimes are poisonous as a result of eating other fish that eat a type of algae which contains the original poison. Knowing that, you can decide whether you want to take a chance on dying as a result of eating those large predatory species, or try something else for dinner.

In trying to create theories, a researcher usually follows a simple but effective methodology. It begins with observation (your own or that which is already known) of facts relevant to a question. An explanation of the question based on the facts is then tested by further observation which is often structured by a prediction. A potentially useful test in the toxic fish theory would be to substitute non-toxic algae in the diets of the fish. If the theory is correct, the fish would be safe to eat. Theory becomes "fact" when it has passed all tests that could possibly prove it incorrect.

Alan R. Emery
Director

(continued from page 1)

arrive in the North with natural history investigations as one of its major goals.

The expedition was organized into two parties. The goal of the Northern Party under Vilhjalmur Stefansson was to search for undiscovered land north of the Beaufort Sea. The Southern Party, led by R.M. Anderson, was to carry out scientific research along the Central Arctic Coast.

Controversy surrounded the expedition from the outset, and several members of the Northern Party lost their lives when their ship became icebound in the Beaufort Sea (see *BIOME* Vol. 3:1). But the expedition, which ended in 1918, was successful in achieving its major goals.

The Northern Party travelled 32,000 km by dogsled to chart the last unknown islands of the Arctic Archipelago. The Southern Party carried out extensive biological, geological and anthropological investigations on the mainland around Coronation Gulf. The collections they brought back were extensive, including over 600 birds and 400 mammals. And, unlike earlier voyages, these valuable specimens remained in Canada and are still part of the Museum's collections.

Museum research in the Arctic slowed considerably after the Canadian Arctic Expedition, but a handful of dedicated scientists continued to travel the North by canoe, snowshoe and dogsled, collecting and preserving specimens for the Museum. The collections grew dramatically when research was resumed after World War II, during which scientific investigations had been halted. The National Museum of Natural Sciences now houses some of the most valuable documentation about the Arctic in the world.

There is also a natural laboratory for arctic research. In 1968, the Museum, with assistance from the Polar Continental Shelf Project, established the High Arctic Research Station at Polar Bear Pass. The Pass is a broad, low valley extending 30 km across Bathurst Island. In the midst of a polar desert, its rich vegetation and shallow wetlands support many arctic mammals, and provide feeding and nesting sites for numerous species of birds.

David Gray, Zoology Division

The High Arctic Research Station, Polar Bear Pass, Bathurst Island.

Such a haven for wildlife is an ideal location for carrying out long-term animal behaviour studies, which seek to understand the complex web of interrelationships that make up this arctic ecosystem. The High Arctic Research Station also permits shorter investigations of a varied nature by Museum and visiting scientists from around the world.

On September 20, 1986, Polar Bear Pass became the first National Wildlife Area in Canada's Far North, thus guaranteeing that this important High Arctic ecosystem will be protected for future generations.

Out of 71 arctic sites proposed for protection, only Polar Bear Pass has so far been granted this status. The decision came after 18 years of pressure from the public and scientists, a process in which the Museum played a key role. The knowledge and understanding gained from studies based at the High Arctic Research Station was a contributing factor in gaining protection for this "Arctic Oasis."

It is the opinion of many scientists that arctic biological research has only just begun. Our knowledge of arctic processes is still not complete and we know far more about what is there than about how it works. It is important to continue long-term research and further our understanding of northern ecosystems. This knowledge not only fulfills our need to explore the missing dimensions of our planet, but is vital to the preservation of the Canadian Arctic Islands.

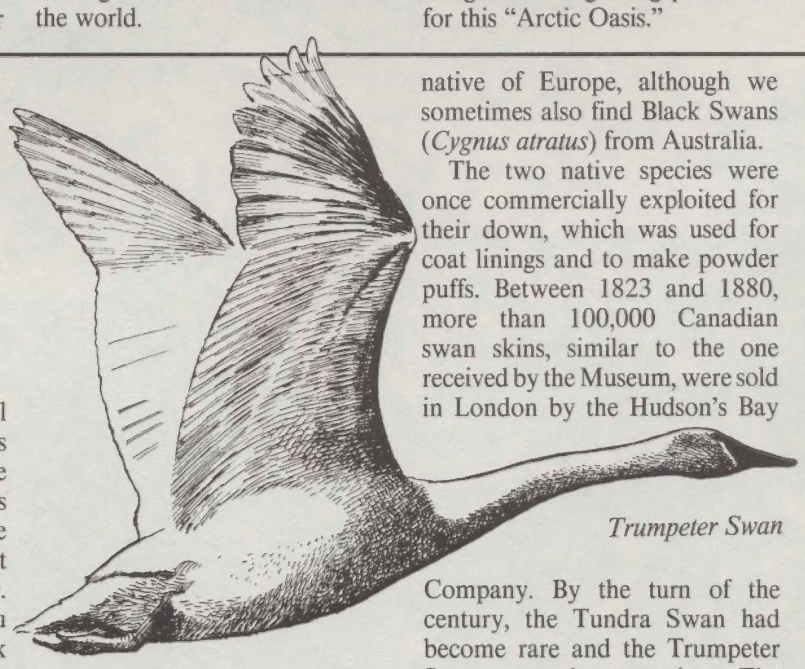
Arctica is on display in the Temporary Exhibits Gallery, 3rd floor east, until March 20, 1988.

Joanne Sparks
Public Services Division

Swan Fur

Some time ago, the National Museum of Natural Sciences received a very unusual gift, the "fur" of a swan. Of course, birds do not have fur — they have feathers. In this case, however, it was indeed a soft, white pliant fur. When you looked at it closely, you could see that the "fur" was a thick white down, still attached to the bird's skin, which had been tanned like a mammal's hide.

Swans are among the largest birds in the Northern Hemisphere. They have especially thick down, like ducks and geese, to which they are related. The down of eiders is famous for its insulating properties, such as in an "eiderdown" quilt. The water-repellent plumage of aquatic birds is particularly dense, and a swan may have more than 25,000 feathers.



Trumpeter Swan

Two species of swan are native to Canada: the Tundra Swan (*Cygnus columbianus*), which nests in the arctic tundra and winters mainly along the coasts of the United States, and the Trumpeter Swan (*Cygnus buccinator*), which once inhabited more southerly regions in Canada and the U.S.A. The swans we see in city parks usually belong to a third species, the Mute Swan (*Cygnus olor*), a native of Europe, although we sometimes also find Black Swans (*Cygnus atratus*) from Australia.

The two native species were once commercially exploited for their down, which was used for coat linings and to make powder puffs. Between 1823 and 1880, more than 100,000 Canadian swan skins, similar to the one received by the Museum, were sold in London by the Hudson's Bay Company. By the turn of the century, the Tundra Swan had become rare and the Trumpeter Swan was almost extinct. The hunting of swans was completely stopped in 1918, with the signing of the Migratory Birds Convention between Canada and the United States. Hunting began again in 1962, but only for the Tundra Swan, and restricted to certain areas. The Trumpeter Swan is still rare, with its numbers concentrated in Alaska and in a few western provinces and states.

Michel Gosselin
Zoology Division

BIOME

Editor-in-Chief:
Nick Bélanger

Acknowledgements:
Bonnie Livingstone
Annie J. Ollivier

Art Direction:
Design Division,
NMNS

Graphic Design:
Acart Graphic Services, Inc.

Illustrations:
Charles Douglas
Kiyomi Shoyama

Cette publication est également offerte en français

Comments and questions should be directed to:

BIOME
National Museum of Natural Sciences
Ottawa, Ontario
K1A 0M8

© National Museum of Natural Sciences, 1987

The Canada–China Dinosaur Project

Dinosaurs in the Arctic? It seems incredible, but Canadian and Chinese scientists are confident that the most northerly dinosaur fossil finds yet will be made in the Northwest Territories.

In the summer of 1986, Canadian and Chinese paleontologists with the Canada–China Dinosaur Project found remains of plesiosaurs (turtle- like marine reptiles with long necks) in strata of middle Cretaceous age on Ellesmere Island in the Canadian Arctic Archipelago. The scientists hope to return to the North in the future to look for evidence of terrestrial species that lived during opening phases of the age of mammals. Dinosaur tracks dating back 135 to 100 million years ago have already been found in Alaska and Spitzbergen.

During the Cretaceous Period, the climate of the Arctic was surprisingly mild, with temperatures similar to those of northern California today. Dinosaurs may well have flourished there, at least during the summer months. When the long winter darkness began, they may have migrated south.

Dinosaur migration is one of the fascinating topics being explored by the Canada–China Dinosaur Project, an historic cooperative venture between the leading authorities on Canadian and Chinese dinosaur fossils. It is the first opportunity Western and Eastern paleontologists have had to work together on intensive field studies.

The project was inspired by some intriguing discoveries about the ancient links between continents. Paleontologists used to believe that all Asian dinosaurs were different from North American ones. Then they started finding "Asian" dinosaurs in North America and "North American" dinosaurs in Asia. Many of the dinosaur fossils found in Canada are remarkably similar to those found in China. Did dinosaurs travel from one continent to another? It's possible because, at various times between 100 and 65 million years ago, North America and Asia were joined in one large landmass.

The research for the project is taking the expedition teams from the searing sands of the Gobi Desert to the badlands of Alberta and to the frigid wastelands of the Canadian Arctic, and covers the geological time span from 150 to 65 million years ago. The Chinese scientists went to the Arctic as guests of the National Museum of Natural Sciences; they also worked in Alberta's Dinosaur Provincial Park as guests of Alberta's Tyrrell Museum.

Clayton Kennedy, Paleobiology Division

Canadian and Chinese paleontologists also visited Axel Heiberg Island in 1986. Dr. Philip Currie examines the Isachsen Formation.

The project is an initiative of the Ex Terra Foundation, a private Canadian non-profit group established in 1984 in Edmonton, Alberta, for this specific purpose. The major institutions involved are the Academia Sinica (the Chinese Academy of Science), the National Museum of Natural Sciences in Ottawa and the Tyrrell Museum of Paleontology in Drumheller. The NMNS and the Tyrrell Museum operate Canada's foremost dinosaur research and display programmes.

Dr. Dale Russell, curator of dinosaurs at the NMNS, and Dr. Philip Currie, acting director of the Tyrrell Museum, have been involved in the project as scientific advisors since its inception.

In May 1986, the Ex Terra Foundation pulled off a coup for Canada when it beat out competition from France, the United States and Great Britain to sign an agreement with the Chinese giving our scientists the right to prospect for dinosaur fossils on the China–Mongolia border.

Dr. Russell, Dr. Currie and their Canadian colleagues were the first Westerners in more than half a century to visit the rich fossil beds in the Xinjiang region of western China when they made their preliminary reconnaissance trip this summer. Fifteen Canadian and 22 Chinese researchers explored the Xinjiang fossil sites together.

Canada and China have, between them, up to half of all known dinosaur fossil species. In fact, the abundance of dinosaur fossils in China may have given rise to "dragon" legends. "Dragon" crops up in place names all over China and "dragon bones" are an important ingredient in Chinese traditional medicines.

Apart from the abundance of fossils, there is another reason Canadian paleontologists are so eager to go to China: the fossil beds there show an unbroken record of dinosaur evolution. Canada's fossil record has gaps because of an ancient inland sea which submerged many areas.

Dr. Russell has done an inventory of the entire 150-million-year-old record of North American dinosaur fauna and of all the sites that have yielded dinosaur remains, to put together a cohesive picture of the dinosaurs and their world. He hopes to do the same thing in China. "What I am really interested in is learning about the faunistics of Chinese dinosaurs: the dinosaurs as a group," he says.

The Canadian and Chinese scientists are considered world leaders in many aspects of the study of dinosaur biology. Their expertise combined with access to the finest dinosaur fossil fields will probably bring a significant expansion of our knowledge.

There are many things we would still like to know about dinosaurs. Were they warm- or cold-blooded? Were they capable of complex behaviour? Did some species live in groups? Are dinosaurs the ancestors of today's birds? The Canada–China Dinosaur Project scientists will be doing population comparisons, trying to reconstruct dinosaur ecology, investigating the evolution of small, intelligent dinosaurs and tackling the classic mystery of the dinosaurs' extinction.

There will be expeditions for the next two summers. The Ex Terra Foundation hopes to bring the work and the results of these joint field studies to millions of people around the world through media coverage, films, books, and educational programmes.

The dinosaurs themselves will be on the move again in 1989, when the Ex Terra Foundation plans to mount a three-year travelling exhibition. Fossils recovered by the expeditions will be featured in the world's first major dinosaur show tour. More than 22 museums have already expressed interest in hosting the exhibition. Dinosaurs are one of the most popular scientific subjects, and the Ex Terra Foundation believes the show will be a sure-fire hit.

Clayton Kennedy, Paleobiology Division

Dr. Dale Russell examines a marine reptile fossil.

Cecilia Blanchfield

Once Upon a Time in the North

In 1986, a paleobotanist from the University of Saskatchewan, Dr. James Basinger, collected and identified tree stumps from a 45-million-year-old fossil forest on the northeast side of Axel Heiberg Island in the Northwest Territories. Although the existence of this fossil forest had been known to science for many years, Dr. Basinger reintroduced its importance to the scientific community and brought to public attention that the barren, ice-covered terrain north of the eightieth parallel was once vastly different from what it is today.

Forty-five million years ago — during a warm climatic trend that geologists term the Eocene — our arctic islands resembled the coastal swamps and bottomlands of the southeastern United States today. Most of the fossil tree stumps identified by Dr. Basinger, some more than a metre in diameter, are related to the living *Metasequoia* or Dawn Redwood, a large conifer related to our pines, spruces and firs. What is most remarkable about this tree is that it was first known as a fossil and then years later was discovered living in a remote, densely forested valley in central China (see *Neotoma* no. 9). The Dawn Redwood differs from our pines and spruces in that it is deciduous and annually sheds its needlelike leaves, as does the Bald Cypress of the southeastern United States, to which it is more closely related.

The stumps standing in place in the permafrost of Axel Heiberg Island, often with attached root systems, are in a mummified state, that is, the wood has not been replaced by minerals (petrified) but has simply been dried out and preserved as real wood. This is due to the initial preservation of the trees in the swampy, anaerobic environment of the Eocene, and more recently because of permafrost. The wood shows annual growth rings and a detailed cellular structure that will allow for further identification and perhaps will help in determining the age of the trees at the time of their death. Some of the wood has retained resin which, remarkably, is still aromatic.

The Paleobiology Division of the NMNS has recently taken a serious interest in this forest, not only for the uniqueness and importance of the almost perfectly preserved tree stumps, but equally for the variety of fossils found in association with them. At some locations, mats of leaf litter on the forest floor have been perfectly preserved. These mats contain twigs, seeds, cones and leaves that can be easily identified to their parent plant; some fossil spruce cones are nearly indistinguishable from living spruce cones. Fossil pollen and spores dispersed within the leaf litter will further aid paleobotanists in identifying the kinds of plants that grew in association with the trees.

*A portion of this fossil Dawn Redwood stump (**Metasequoia**) collected by Dr. Basinger is on display in the "Arctica" exhibit.*

During this summer's field season, scientists from the Paleobiology Division of the NMNS, the University of Calgary and the Canadian Conservation Institute visited Axel Heiberg Island and collected additional plant fossil specimens, including leaf litter mats. Such litter is rarely preserved at fossil sites. The collected mats contain a wealth of information about Canada's arctic heritage, a heritage that we are continuing to discover.

J. Basinger

*A fossil cone of spruce (**Picea**) from Axel Heiberg Island.*

David M. Jarzen
Paleobiology Division

Off the Press

Weatherwatcher's Diary
Carol Thiessen

228 pp.
ISBN 0-660-10351-6
180 × 230 mm
$7.95 (PB, spiral binding)

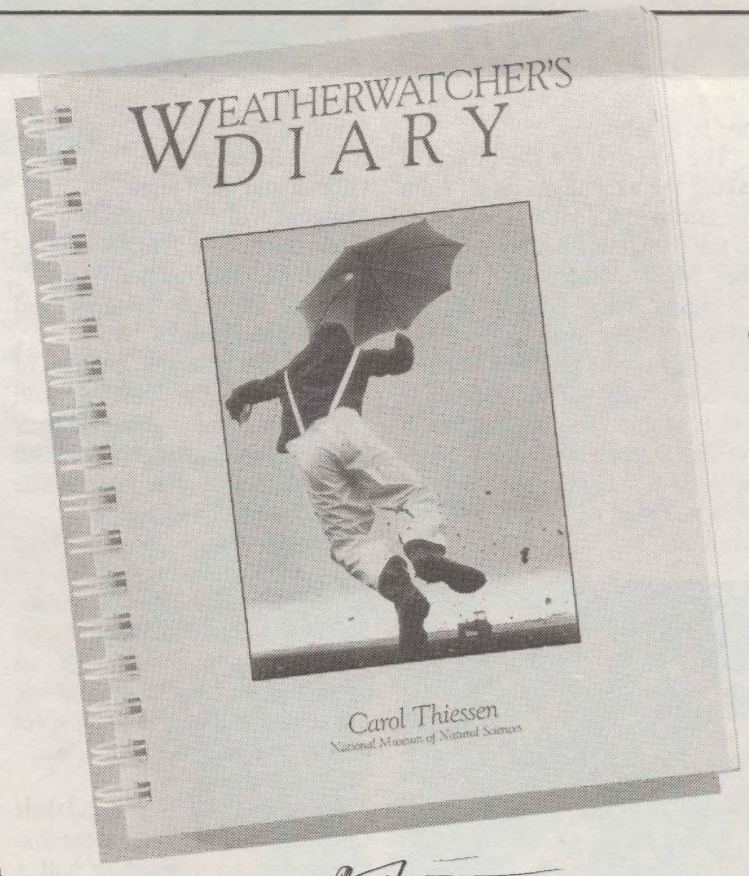
Édition française:
Journal de météorologie
ISBN 0-660-90301-6

Did you know that the coldest day on record in North America was in Snag, Yukon, when the temperature plummeted to –67°C? That the climate of the Prairies was once subtropical and trees grew there that resembled those found in Florida today? That a ring around the moon is usually a sign that rain is on the way?

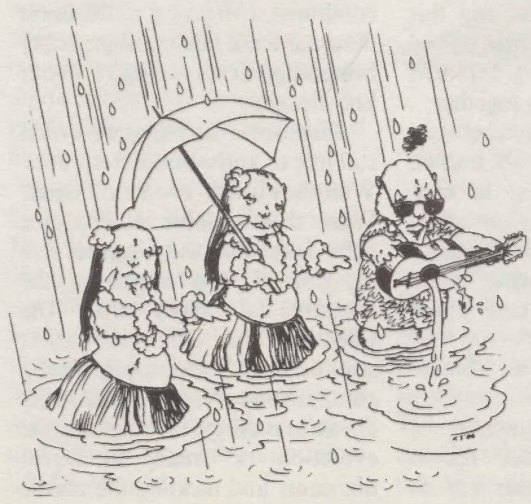
Discover more about these and other meteorological miscellany in the *Weatherwatcher's Diary*. This unique agenda calendar produced by NMNS Exhibition Programmer Carol Thiessen encourages you to notice factors such as shifting winds and cloud patterns, the arrival of migratory birds in spring and fall, and the formation and breakup of ice on rivers.

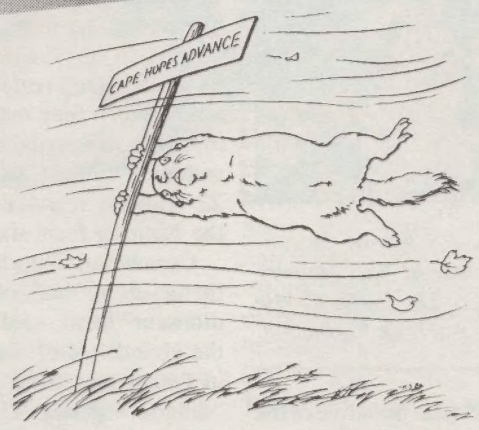
The *Weatherwatcher's Diary* has no year or days of the week; you can begin it at any time and use it for more than one year. For each day, there are spaces to enter statistics on temperature, precipitation, air pressure and wind speed. In addition to interesting weather facts and fancies, it contains useful materials, such as weather signs, a wind chart, and a cloud chart, to help weatherwatchers note changes in the weather and perhaps try their hand at weather forecasting. With only two days per page, there is ample room to write personal observations as well as daily records of the weather. Colour and sepia-tone illustrations highlight each month, and line drawings add humour to the various weather trivia and tall tales.

If you are a gardener, skier, cottager, naturalist, or if you have more than a passing interest in the weather, you will enjoy keeping personal notes when each turn of the page reveals new facts, folklore, milestones, and history. The *Weatherwatcher's Diary* is available in bookstores nationwide.



The wettest place in the United States is Mt Waialeaie on the island of Kauai, Hawaii, with an average annual precipitation of 11.684 m! This is also a world record.





On 18 November 1931, winds of 201.1 km/h pounded Cape Hopes Advance, Quebec, for an hour, setting a record for the highest sustained winds in Canada.

The largest hailstone ever recorded in Canada fell at Cedoux during a severe storm that swept across southern Saskatchewan on 27 August 1973. It was 11.4 cm in diameter and weighed 290 g.

"Up there in New Brunswick the weather can change awfully quick. One time I was watching the trout jump on the lake and a cold squall come down from the north. I walked out on the ice and picked up a fine mess of trout."

A Nova Scotia fisherman